HOLD FOR RELEASE UNTIL
PRESENTED BY WITNESS

FEB 4 1975

STATEMENT OF

Dr. James C. Fletcher
Administrator

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

before the

Committee on Science and Technology
House of Representatives

Mr. Chairman and Members of the Committee:

It is a pleasure to be here today to present an overview of NASA's authorization request for FY 1976.

Accompanying me today are Dr. George M. Low, Deputy Administrator of NASA; Dr. Rocco Petrone, Associate Administrator; Mr. Willis H. Shapley, Associate Deputy Administrator; Mr. Elmer S. Groo, Associate Administrator for Center Operations; and Mr. William E. Lilly, the NASA Comptroller. The other senior NASA officials who will be testifying before your Subcommittees are here to assist us in responding to your questions.

The FY 1976 authorization bill we have submitted corresponds to and is designed to implement the FY 1976 budget recommendations submitted to the Congress yesterday by President Ford. As indicated on the table attached to my statement, the authorizations requested for the twelve months

of FY 1976 total $3,539 million. For the three-month transition period to the new fiscal year, the requested authorizations total $958.9 million. Finally, under the new system calling for submission of authorization requests a year ahead, the authorization bill we have submitted includes authorizations totalling $3,625 million for FY 1977. As pointed out in my letter to the Chairman transmitting the bill, the FY 1977 authorization amounts included in the bill do not include provision for future inflation.

Mr. Chairman, some background on this year's budget request may be helpful. This is the fourth annual budget NASA has submitted since we established the long-range program and budget plan known as the "constant budget" approach. Back in FY 1971 and 1972, the NASA budget had been cut almost in half--from nearly $6 billion at the peak of the Apollo program to about $3.4 billion, but the program as planned at that time would have required large increases in future years. In the FY 1973 budget, we presented and the Congress approved the development of the reusable Space Shuttle as the principal project to advance space technology in the 1970's. As a part of this proposal, we also presented a revised program plan under which <u>total</u> NASA expenditures would not have to exceed the then current level of $3.4 billion except for inflation. We undertook to conduct a

less ambitious program within this "constant budget" level because we recognized that fiscal constraints, in the early 1970's at least, probably would not permit an increased space budget, and because we believed that stability and continuity in the program were essential and that it was our duty as responsible managers to conduct our program in a way that the total level of future commitments required was clearly limited in advance.

Since FY 1973, Congress has generally approved our budget requests substantially as submitted but we have had to reduce our budgets for government-wide fiscal reasons well below the $3.4 billion level, measured in equivalent dollars, as shown on the chart attached to my statement. On this basis, our FY 1976 budget request corresponds to only about $2.8 billion.

I have reviewed these facts, Mr. Chairman, to remind the Committee that the NASA program has been substantially cut back and that we are conducting our program within severe financial constraints.

Most significantly, our FY 1976 budget program contains no new program starts, in accordance with the President's government-wide policy of no new programs this year except in the energy field. This means that our entire FY 1976 authorization request is for continuing and extending previously approved programs now underway.

Further financial constraints have been applied in FY 1975 and in our FY 1976 budget:

- We have deferred obligations of $72 million in FY 1975, slowing the pace of work, with the possibility of some slippage of launch schedules in some applications programs. This was part of the Administration's effort to hold down spending in FY 1975.
- We are reducing civil service employment by 300 in FY 1975, as a part of the Administration's overall reduction of 40,000.
- We have had to make program adjustments to stay within our total budgets for FY 1975 and FY 1976 at the inflation rates we are now experiencing. If inflation increases above the present rates we are now experiencing--about 9% per year--we will have to make further program adjustments as we go along.

Our total budget for FY 1976 is up about $300 million from FY 1975. However, about $200 million of this is the built-in net increase required for on-going program commitments which was presented to Congress in the FY 1975 budget last year. This means that on an overall basis we have an effective increase of only about $100 million, or 3%, much less than the current rate of inflation.

On a more positive note, I am glad to be able to say that the FY 1976 budget will permit us to proceed with all of our presently approved major programs generally as planned. Let me mention six points of special interest and significance.

- Space Shuttle development will proceed on the present schedule, pointed to a first manned orbital flight in mid-1979. We will not have to make another disruptive slip in the Shuttle schedule as was necessary under the FY 1974 and FY 1975 budgets. To keep to schedule, however, we had to reduce the technical content of the program in FY 1976 which increases the technical risk somewhat but within prudent bounds.
- LANDSAT-C (formerly called "ERTS-C"), authorized by Congress in FY 1975, will proceed. LANDSAT-C will be NASA's third experimental earth resources satellite, scheduled for launch in the fall of 1977. It will test improved sensors and complete the experimental demonstrations in crop surveys, water resources management, and many other fields now being undertaken by LANDSAT-2, which was successfully launched a few days ago on January 22.

- Aircraft energy reduction will continue as a principal focus in our aeronautics research and technology work. We have identified technologies which have the potential in the next ten years to reduce the fuel requirements of commercial jet aircraft by 50%. If these advances are achieved by 1985 and could then be incorporated in the number of U.S. commercial aircraft flying today, the savings in crude petroleum requirements would be about one-third of a million barrels per day. With the expected growth in air traffic, by 1990 the savings for the expanded fleet could be 0.8 million barrels per day.
- Study of the problems of the stratosphere, including the effects of pollutants that might adversely affect the environment, will continue in a coordinated effort as we bring data and results from many different NASA programs to bear on this important problem. Significant contributions will continue to come from NASA's meteorological and atmospheric satellites, from our sounding rocket, balloon, and high-flying aircraft research programs, and from comparative studies of the atmospheres of other planets coming out of our planetary exploration programs (in which much of the nation's scientific expertise for upper atmosphere studies has been developed).

- Even though we do not have any new program starts in the FY 1976 budget, we will continue study and advanced technology development for projects to be started in future years. In science, applications, and aeronautics there will be special emphasis on planning and preliminary work on the experiments and applications to be carried out on the Space Shuttle and Spacelab missions in the early 1980's.
- Finally, we are entering one of the most active periods in U.S. space flight this year, as NASA projects under development for many years reach their launch dates and as we launch, on a fully reimbursable basis, a record number of satellites for commercial communications and other domestic, foreign and international organizations. A total of 28 launches are scheduled for calendar year 1975, as shown on the list attached to my statement. Of the 28 launches, 18, or 65% are experimental or operational applications satellites. Also, 14, or 50% of the 28 launches are reimbursable and not paid for out of NASA's appropriations. These figures illustrate the degree to which the space program is now oriented to practical applications. They also show that the space age has now arrived at the point where the use of satellites is accepted as a means of providing beneficial services which are economically profitable.

I am also glad to report that NASA has made significant progress in the field of Equal Employment Opportunity (EEO). In 1974 we exceeded, in some cases by a factor of two, the goals we set last winter for hiring of women professionals, minority professionals, and minority non-professionals. While progress will be made more difficult by the additional 300-person reduction in civil service employment we have been required to make in FY 1975, we will shortly be establishing more ambitious EEO goals for calendar year 1975, and fully intend to meet them.

The NASA programs -- our recent accomplishments, current activities, and future plans -- will be presented in detail to your Subcommittees and in the FY 1976 budget justification books which will be available shortly. I will touch briefly on some of the highlights:

In aeronautics, in addition to the focussed effort on aircraft energy reduction I have referred to, we are moving ahead on a broad front to develop the technology for improving the capability and performance of civil aircraft, and are working with the Department of Defense to improve the performance of military aircraft in each of the areas of NASA's special competence.

We remain very sensitive to the environmental problems of air transportation. Our work on noise and pollution reduction continues.

Airport congestion is one of the most important limiting problems confronting the growth of our air transportation system. We are exploring the technology that could help relieve this congestion. One possibility is the use of aircraft whose lift capability at low speed is improved through the use of propulsion system air flow to provide shorter takeoffs and landings as compared to conventional aircraft.

In cooperation with the military services, we are developing two unique rotor research aircraft. One will be used for advanced helicopter rotor blade research. The other is a "tilt rotor" research aircraft to develop the technology for aircraft that have the capability for vertical flight like a helicopter and the ability to cruise like a conventional propeller-driven aircraft.

We are continuing to augment our programs aimed at providing advanced technology to the general aviation community. The enthusiasm shown by the industry for advances such as the new fuel-saving airfoil we have developed, is very encouraging.

Our aviation safety program is focusing on problems which arise in or near the airport terminal where the majority of fatal aircraft accidents occur. Of particular interest are improved terminal-area aircraft control, and reduction of aircraft trailing wake vortices that can adversely affect aircraft which follow, new materials for

reduced fire hazard, and structural and constraint system design to improve the chances of passenger and crew survival in crashes. We shall continue to work closely with the FAA on these matters.

Looking to the more distant future, we are keeping our technological options open in aeronautics. Our research programs related to supersonic and to hypersonic flight continue at appropriately constrained levels, but with sufficient effort to maintain progress and capabilities in these fields.

In space applications, we are experimenting with a wide variety of ways in which satellites and other technology developed in the space program can be put to practical, beneficial use. The use of satellites for earth resources surveys is an area of special promise. Based on our experiments and economic studies to date, we can foresee potential economic benefits to the United States of many hundreds of millions of dollars per year through uses of satellite-collected data -- for inventorying and monitoring crops, for water resources management, range land management, and numerous other uses. Actual benefits are already being realized in the experimental program, but much more work in the experimental demonstrations of operational uses and the detailed assessment of potential benefits needs to be done. One of the most important demonstrations, our joint "LACIE" crop inventorying experiment with the Department of Agriculture and the National Oceanographic and Atmospheric

Administration, was discussed by Assistant Secretary Yeutter this morning. With LANDSAT-2 now in orbit and functioning well, and the improved LANDSAT-C to be launched in 1977, NASA and the many other Federal, State and local user agencies working with us will be able to determine how the nation should best take advantage of these capabilities for remote sensing of the earth's resources from space.

NASA has many other important space applications programs underway. In the field of meteorological satellites, the first "synchronous" meteorological satellite -- SMS-1 -- was launched last year to keep continuous watch on the weather affecting the United States. It will be joined in a few days by SMS-B, scheduled to be launched this week, and later this year by GOES-A, the National Weather Services' first operational satellite of this type.

Also in the area of weather and climate, this year and next (1975 and 1976) will bring the launch of Nimbus-F (May 1975), the development of the TIROS-N and NIMBUS-G, and further experiments in the international Global Atmospheric Research Program. Nimbus-F is expected to contribute greatly to our understanding of atmospheric processes that influence weather and climate. TIROS-N is the forerunner of a new operational polar orbiting weather satellite system. Nimbus-G will be our first satellite dedicated to the monitoring of pollution.

In other applications areas, the program includes the GEOS-C oceanographic satellite to be launched next month to

demonstrate capabilities to measure the sea surface and sea state on a global basis. We are proceeding with the development of SEASAT, a more capable and sophisticated ocean monitoring satellite to be launched in 1978. Early studies indicate that information derived from SEASAT will be economically beneficial to the shipping and fishing industries and to maritime and shoreline construction projects, and will add to our ability to make longer range weather forecasts later in this decade. LAGEOS (Laser Geodynamic Satellite), which is scheduled for launch in March 1976, will support investigations into motions of large sections of the earth's crust so that we can better understand the mechanics and causes of earthquakes.

In space science, we are proceeding with one of NASA's basic missions--the exploration of space. We are exploring the solar system with spacecraft that can actually go out to the planets, and penetrating the more distant reaches of the universe with spaceborne telescopes and instruments that can discover and measure new phenomena which are invisible from earth.

In the planetary program, we have had some outstanding scientific and technological successes during the past year. Mariner 10 flew by Venus in February and by Mercury in March and again in September, collecting a wealth of scientific data and pictures of the two planets nearest the sun at each pass. This little spacecraft has already given us two planets for the price of one plus a bonus look at Mercury, and is now heading for a third pass at Mercury next month; as of now the spacecraft and instruments are still going strong. In the other direction, away from the sun, Pioneer 11 became our second spacecraft to make closeup observations and measurements of Jupiter and is now on a trajectory to Saturn. Work is proceeding as planned on the next Pioneer and Mariner missions. Mariner-Jupiter-Saturn (MJS), approved in FY 1973, will explore in greater detail the features discovered by Pioneer 10 and 11.

Pioneer-Venus, approved last year, will monitor Venus continuously from orbit and send instrumented probes into its thick atmosphere, to advance our studies of the similarities and differences of the atmospheres of earth and Venus.

Our biggest and most important planetary enterprise is the Viking program to land two unmanned spacecraft on Mars. This is by far the most complex and technologically advanced unmanned space system NASA has ever attempted to develop. If it is successful, it will also give the greatest return. It will give the first detailed analysis of soils and surface conditions on Mars and the first direct search for evidence of life on another planet. To do this, we have to pack into a one-foot cube enough miniaturized equipment to do automatically 225,000,000 miles away work that would require four or five laboratories and a couple of dozen technicians here on earth.

As we have reported to the Committee, we have had serious difficulties in the Viking program during the past year. I am glad to report today that the troublesome technical problems with certain spacecraft and experiment components now seem to be on the way to resolution. Unless unforeseen new problems arise, we are now optimistic that the two Viking spacecraft will be ready for launch in August of this year.

In space astronomy, astronomers are still operating the space telescopes on an orbiting astronomical observatory (OAO-3) launched 2 1/2 years ago to survey the sky in invisible ultra-violet light. In a few months we will launch a specialized small satellite called SAS-C to measure X- and gamma-rays from space which also cannot be seen from the ground. Incidentally, the able manager of this project is Marjorie Tounsend. Perhaps we can regard this launch as one of NASA's contributions to the observance of International Women's Year in 1975 proclaimed by the President. We have under development a more versatile observatory satellite known as HEAO -- the High Energy Astronomical Observatory. The first in a series of three is to be launched in 1977 for better measurements of the radiations that come from distant space. We are also continuing our studies of a possible future Large Space Telescope (LST) in accordance with last year's guidance from the Congress.

Our major space system development project is, of course, the Space Shuttle. The Space Shuttle is a manned space vehicle that takes off like a rocket, operates in space up to 30 days, lands like an airplane, and can be reused over and over again. It will be used to put satellites in orbit in place of present types of launch

vehicles that are expended in each use, and as a manned space laboratory. The result will be less expensive and more routine space operations for all types of applications.

During the past year the shuttle has definitely moved out of the design phase into hardware fabrication and test. Full scale engine components are being tested. The crew compartment of Orbiter #1 has been built and is now undergoing pressure tests. Other sections of Orbiter #1 -- the wings and center and aft fuselage sections -- are well along and will soon be arriving at the assembly plant at Palmdale, California. Roll-out of Orbiter #1, prior to horizontal flight tests, is expected in the fall of 1976. Contracts have been awarded for the Solid Rocket Motors and the External Tank, the other major elements of the Space Shuttle, and work on these elements has begun. At this time we are confident that we will develop the Space Shuttle successfully -- with the performance, on schedule, and within the cost we have specified in advance.

NASA's only manned space flight before the first orbital flight of the Shuttle in 1979 is the Apollo Soyuz Test Project (ASTP) flight this July. Preparations for this first joint US-Soviet space mission are continuing to go well. The Soviet crew will arrive in a few days for

the final joint-crew training sessions in this country; in April the final joint training in the U.S.S.R. will begin. This program is significant not only for the development of a universal space docking system and for the scientific experiments that will be conducted. It is also an experiment in how we can work with the Soviets on a complex technological project.

In energy research and development we are continuing our efforts of exploring ways in which space technology can be applied to meet the nation's energy problems. NASA was given specific responsibilities in two pieces of legislation initiated by this Committee and enacted by Congress late last year. Under the Solar Heating and Cooling Demonstration Act of 1974, NASA and HUD have completed and sent to the Congress a demonstration plan for residential dwellings as contemplated in the Act. A demonstration plan for commercial applications has been drafted as have the requests for proposals from industry and small business required to implement the Act. NASA's responsibilities have now been formally transferred to the new Energy Research and Development Agency (ERDA) in accordance with the law; however, the administrator of ERDA has indicated his desire for

continued involvement of NASA laboratories in various aspects of solar research and development. Under the Geothermal Energy Research, Development and Demonstration Act of 1974, NASA, in cooperation with ERDA, is working to help define a comprehensive national plan for the effective development and utilization of geothermal resources on a national and regional basis. We are working with ERDA on other energy projects such as low pollution and high fuel economy, gas turbines for automobiles, the harnessing of wind energy, the development of low cost solar cells to convert sunlight into electricity (a technique we use in many of our spacecraft), and a comparative study of the many ways to convert coal or coal-derived fuels into useful power in central power stations. We are cooperating fully with the newly established ERDA and are prepared to help them further in any way we can.

In addition, NASA and the Department of the Interior have begun program definition studies under a new interagency agreement which we hope will lead to technological advances which will improve the rate and safety of extracting coal or coal-derived energy from underground mines.

Besides our cooperative efforts with ERDA, we are also working on directly funded, energy-related projects. For instance, we are working on the development of a high efficiency, low pollution internal combustion engine (a project started in an attempt to find ways to make aircraft engines more efficient, but applied to automobile engines as well). This concept is referred to as "hydrogen injection" and is producing promising results. We are also working on integrated utility system technology which is a projection of our experience in providing life support systems for our manned spacecraft. And, we are studying the technical and economic feasibility of providing electrical power to earth from large satellite solar power stations.

In conclusion, Mr. Chairman, let me emphasize that NASA's aeronautics and space programs, and especially the advanced technology we are developing, are indeed relevant to today's world and today's problems. More than ever before, the many complex problems which face the world -- in energy, food, transportation, and pollution control, for example -- require solutions in which new and innovative technology will have to be one of the major elements. The long-term answer to the problem of inflation is increased productivity; this too depends on advances in technology. This morning we presented some examples of the ways in which NASA programs are directly and indirectly helping

solve today's and tomorrow's problems. In the Committee's review of our FY 1976 authorization proposals in the weeks to come, we look forward to discussing with you the details of our aeronautics and space programs and how they contribute to a better world.

Mr. Chairman, this concludes my prepared statement.

Attachments:
1. Summary of Authorization Requests
2. NASA Budget History
3. 1975 space launches by NASA

Attachment #1

National Aeronautics and Space Administration

FY 1976 AUTHORIZATION BILL
(Thousands of Dollars)

SECTION 1

FY 1976
July 1, 1975 - June 30, 1976

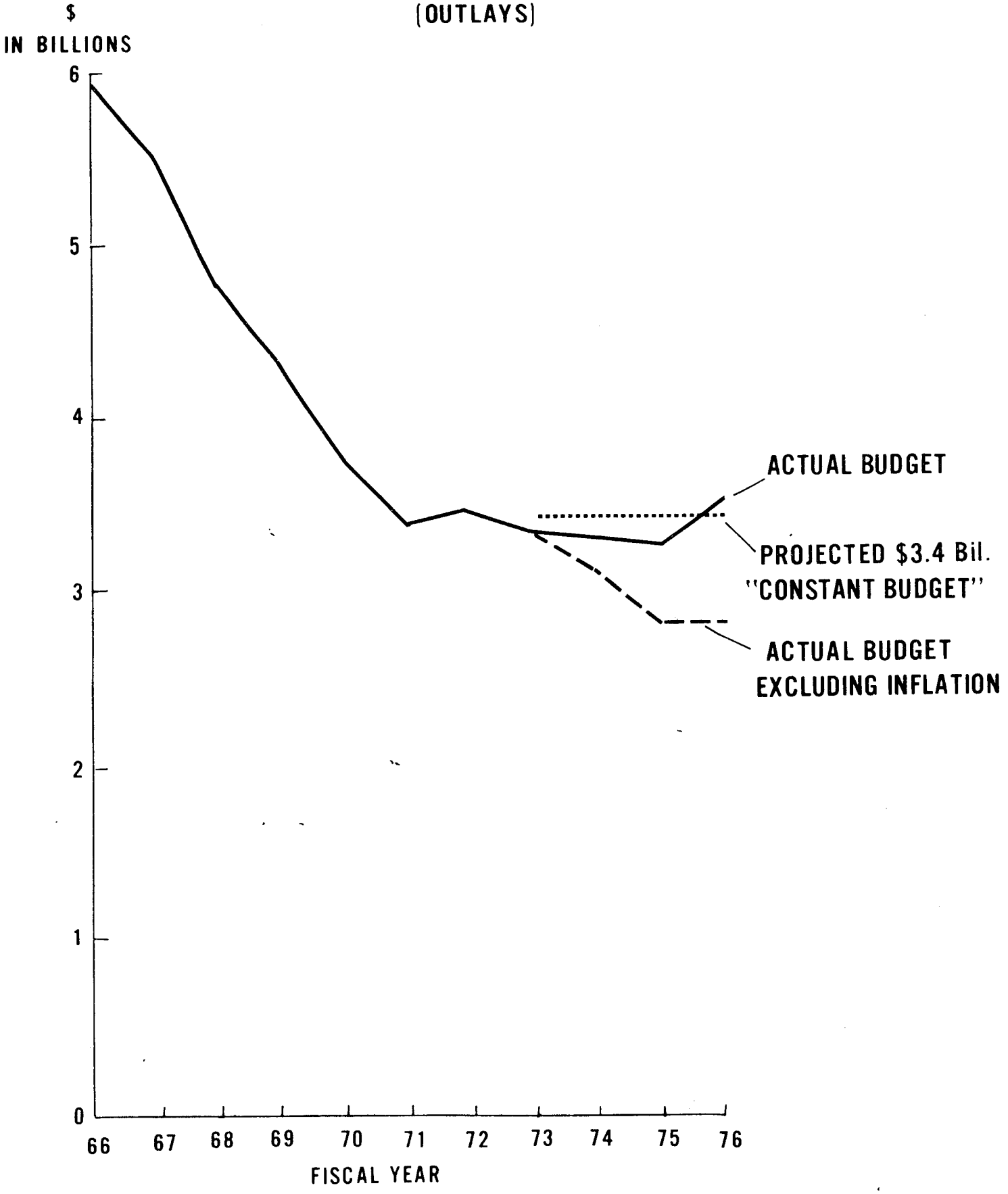
	FY 1974 Budget Plan	FY 1975 Budget Plan	FY 1976 Authorization Requested
RESEARCH AND DEVELOPMENT			
Space Shuttle	475,000	797,500	1,206,000
Space Flight Operations	523,400	311,300	207,100
Advanced Missions	1,500	1,500	1,500
Physics & Astronomy	94,000	136,315	155,800
Lunar & Planetary Exploration	392,482	266,000	259,900
Launch Vehicle Procurement	178,000	140,500	166,900
Space Applications	159,000	174,500	175,030
Aeronautics Research & Technology	168,000	166,400	175,350
Space & Nuclear Research & Technology	66,307	71,365	74,900
Energy Technology Applications	4,693	4,435	5,900
Tracking & Data Acquisition	244,000	248,000	243,000
Technology Utilization	4,500	5,500	7,000
RESEARCH AND DEVELOPMENT	2,310,882	2,323,315	2,678,380
CONSTRUCTION OF FACILITIES	101,100	142,655	84,620
RESEARCH & PROGRAM MANAGEMENT	743,968	765,175	776,000
TOTAL	3,155,950	3,231,145	3,539,000

	SECTION 7	SECTION 8
	Transition Period Jul.1-Sept.30, 1976	FY 1977 Oct.1, 1976-Sept.30, 1977
RESEARCH AND DEVELOPMENT	730,600	2,702,900
CONSTRUCTION OF FACILITIES	14,500	146,100
RESEARCH & PROGRAM MANAGEMENT	213,800	776,000
TOTAL	958,900	3,625,000

Attachment #2

NASA BUDGET HISTORY

(OUTLAYS)



SPACE LAUNCHES BY NASA

1975

	Mission	Description	Launch Date
1.	LANDSAT-2	Second experimental Earth Resources Technology Satellite to test and demonstrate the utility of satellite remote sensing of earth resources, including crop inventories, water resources, etc.	Jan 1975 Launched
2.	Synchronous Meteorological Satellite - SMS-B	Second developmental satellite to provide continuous weather observations and help develop an environmental network for routine observations and early warning of storms.	Feb 1975
3.	Comsat Intelsat IV F6	Continuation of Intelsat series of synchronous satellites providing commercial global telecommunications service to members of the International Telecommunications Satellite Consortium. Reimbursable.	Feb 1975
4.	Telesat-C	Third in a series of Canadian communications satellites to provide television, voice, data and other communications throughout Canada. Reimbursable.	Mar 1975
5.	Geodynamic Experimental Ocean Satellite - GEOS-C	Oceanographic and geodetic satellite to measure ocean topography, sea state, and other features of the earth.	Mar 1975
6.	Comsat Marisat A	Comsat Corporation satellite to provide maritime satellite communications services. Reimbursable.	Apr 1975
7.	Nimbus-F	Experimental meteorological satellite to test instruments for expanding capabilities for remote sensing of the atmosphere.	May 1975
8.	Orbiting Solar Observatory OSO-I	Scientific satellite to investigate a variety of specific features of the sun.	May 1975

Attachment #3

9.	Comsat Intelsat IV F1	Continuation of Intelsat series of synchronous satellites providing commercial global telecommunications service to members of the International Telecommunications Satellite Consortium. Reimbursable.	May 1975
10.	Small Astronomy Satellite SAS-C	Third in a series of small astronomy satellites to survey the celestial sphere and search for sources radiating in the X-ray, gamma ray, ultraviolet and other spectral regions both inside and outside our galaxy.	May 1975
11.	Synchronous Meteorological Satellite/Geostationary Operational Environmental Satellite - SMS-C/GOES-A	The first operational synchronous meteorological satellite of the National Weather Service of the Department of Commerce to provide continuous day and nighttime global cloud-cover observations. Reimbursable.	June 1975
12.	Apollo/Soyuz Test Project ASTP	The U.S. launch for the joint U.S.-Soviet manned space flight. American astronauts in an Apollo spacecraft will rendezvous and dock with Soviet cosmonauts in an orbiting Russian Soyuz spacecraft to test a new universal docking system and to conduct joint and unilateral experiments.	July 1975
13.	Relativity (Gravity Probe)	Scientific satellite to make a test of Einstein's Theory of Relativity.	July 1975
14.	European Space Research Organization - COS-B	European scientific satellite to study extraterrestrial gamma radiation. Reimbursable.	July 1975
15.	Comsat Marisat B	A second Comsat Corporation satellite to provide maritime satellite communications services. Reimbursable.	July 1975
16.	Comsat Intelsat IVA-A	First of a series of improved Intelsat Consortium satellites that will have almost double the capacity of the present Intelsat IV satellites. Reimbursable.	July 1975

17.	Viking A	Planetary mission to explore Mars from orbit around the planet and with a capsule on its surface.	Aug 1975
18.	Viking B	Same description as Viking A.	Aug 1975
19.	Atmosphere Explorer D	A scientific satellite to investigate the chemical processes and energy transfer mechanisms which control earth's atmosphere.	Sep 1975
20.	Symphonie B	Second joint French/German experimental communications satellite designed for TV, telephone, and data transmission. Reimbursable.	Sep 1975
21.	Comsat Intelsat IVA-B	Second of a series of improved Intelsat Consortium satellites. Reimbursable.	Oct 1975
22.	Improved TIROS Operational Satellite - ITOS-E2	Operational meteorological satellite of the National Weather Service to provide daytime and nighttime cloud cover imagery. Reimbursable.	Nov 1975
23.	Dual Air Density	Two scientific spacecraft will be placed in orbit to obtain simultaneously measurements of the composition of upper and lower levels of the atmosphere.	Nov 1975
24.	RCA-A	First of a series of domestic communications satellites for RCA. Reimbursable.	Dec 1975
25.	Cooperative Applications Satellite/Communications Technology Satellite CAS-C/CTS	Canadian-U.S. cooperative experimental communications satellite to develop and test the technology of high power satellite communications systems.	Dec 1975
26.	Comsat Domestic Communications Satellite - CDCS-A	Domestic communications satellite for Comsat Corporation. Reimbursable.	Dec 1975

27.	Atmosphere Explorer E	A second scientific satellite to investigate the chemical processes and energy transfer mechanisms which control the earth's atmosphere.	Dec 1975
26.	TRANSIT	Optional Navy navigation satellite. Reimbursable	Dec 1975